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Patent/Hormadaly 0-03-155/ 12216/US/00

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor: Hormadaly  
Serial no.: 10/620,568  
Filed: July 16, 2003  
Title: THICK FILM COMPOSITIONS CONTAINING PYROCHLORE-RELATED COMPOUNDS  
Examiner: Mark T. Kopec  
Art Unit: 1751

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**Response**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir/Madam:

This response is in reply to the office action mailed on December 20, 2004.

The response can be found at page 2 of this submission.

The claims can be found at page 3 of this submission.

Respectfully submitted,

Date: 3/10/05

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I hereby certify that this correspondence is being deposited with the United States Postal Service by first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date below:

Date: 3/10/05 Kevin D. McCarthy [Signature]  
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### **Response**

The examiner has indicated that original claims 5-8 and 14-15 were allowable over the cited references. The other claims (1-4, 9-13 and 16-23) were “rejected under 35 U.S.C. 103(a) as being unpatentable over Hormadaly (4,961,999) in view of either Hazoui et al. (Materials Research Bulletin) or Mayer-von Kuerthy et al. (Zeitschrift fuer Naturforschung).” Applicant respectfully traverses that rejection and appreciates the notification of allowable subject matter.

Ruthenium based pyrochlores are used to make thick film resistors with small temperature coefficient of resistance. The pyrochlores (as a conducting phase) are dispersed in an organic vehicle (to promote printing) and glass powder. According to the inventors, it became clear after numerous experiments that the pyrochlores and the glasses react during the firing and result in a mixture of  $\text{RuO}_2$ , pyrochlore and modified glass. Sometimes the pyrochlore decomposed completely to  $\text{RuO}_2$ .

In U.S. patent number 4,961,999; Hormadaly provided an excellent example of the interaction of pyrochlore and glass mentioned above. Instead of getting a resistor (by mixing glass and pyrochlore, as taught in the prior art) Hormadaly obtained a thermistor – a thermally sensitive resistor; resistor with a large temperature coefficient of resistance.

In view of these facts, the applicant wants to assert that it is not obvious how a certain glass and a given ruthenium pyrochlore will react and therefore, it is impossible to predict if the outcome is a resistor or thermistor. Moreover, it is impossible to predict the properties of the resulting materials. Moreover, Hazoui et al. and Mayer-von Kuerthy et al. fail to teach, disclose, or suggest the claimed pyrochlore compound will react as claimed and obtained the claimed properties. For at least these reasons, these references are improper for rejecting the instant claims.

In this application, the invention is directed to pyrochlore-related compounds of the general formula  $\text{M}_{2-x}\text{Cu}_x\text{Ru}_2\text{O}_{6+\delta}$ , wherein M is a rare earth metal selected from the rare earth metals of atomic number 60-71 with glasses. The outcome is new and nonobvious in view of the uncertainty of the outcome from reacting and in relation to properties of the pyrochlore and glasses.

It is respectfully submitted that these claims are in condition for allowance and such allowance is respectfully requested.